June 29, 2011

Mr. Mark Austin
Project Manager
New Jersey Remediation Branch
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 2
290 Broadway
New York, NY 10007-1866

RE: Former American Cyanamid Site – Wyeth Holdings Corporation
Bridgewater Township, New Jersey
Impoundments 1 and 2 Focused Feasibility Study Work Plan
FILE: 4529\47194 #2

Dear Mr. Austin:

On behalf of Wyeth Holdings Corporation, attached please find the Focused Feasibility Study Work Plan for Impoundments 1 and 2 at the above-referenced site. In accordance with EPA's letter dated September 25, 2009, this Work Plan addresses Impoundments 1 and 2 separately from the Site-wide Feasibility Study, and was prepared in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the Resource Conservation and Recovery Act (RCRA), and the NJDEP Administrative Consent Order (ACO) for the Site (May 1988, as amended May 1994).

If you should have any questions, or if I can be of any further assistance, please feel free to call me.

Very truly yours,
O'BRIEN & GERE ENGINEERS, INC.

Angelo J. Caracciolo, III
Senior Project Manager

540486

cc:

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WORK PLAN

Former American Cyanamid Site
Impoundments 1 and 2
Focused Feasibility Study
Work Plan

Wyeth Holdings Corporation
Bridgewater, New Jersey

June 2011

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDIX

1. INTRODUCTION

This document presents the approach for developing a Focused Feasibility Study (FFS) for the material in Impoundments 1 and 2 located at the Former American Cyanamid facility (Site) in Bridgewater Township, New Jersey.

1.1 BACKGROUND

The Site is located in the north central portion of New Jersey, and the southeastern section of Bridgewater Township, Somerset County. The Site is bounded by the New Jersey Transit Railroad to the north, the Raritan River to the west and south, and Somerset Tire Service and Interstate Highway 287 to the east, as shown on Figure 1. Figure 2 is a Site map.

The Site encompasses approximately 435 acres and had been used for numerous chemical and pharmaceutical manufacturing operations during the past 80-plus years. The facility was originally built in 1915, as Calco Chemical Company, to manufacture intermediate chemicals and dyes. The plant expanded over the next 60 years to become one of the nation's largest dye and organic chemical plants, producing thousands of chemical products. The facility experienced a significant downsizing in the late 1970s and early 1980s, to the point where all organic chemical and dye production was phased out by the early 1980s. The manufacture of bulk pharmaceuticals continued throughout the 1990s. American Home Products Corporation, later known as Wyeth, acquired American Cyanamid in November 1994. Manufacturing at the Site ceased in 1999 and, since then, the site has been inactive. Pfizer Inc (Pfizer) acquired Wyeth and its subsidiaries (e.g. Wyeth Holdings Corporation) in October 2009, and is now responsible for the former American Cyanamid site.

The Site is generally divided into two main portions. The Main Plant refers to the portion of the Site within the flood control dike, and the Flood Plain refers to the portion of the Site outside the flood control dike (See Figure 2). Approximately 50% of the Main Plant was used for production activities over the time the facility was active. Of the remaining Main Plant area, surface impoundments cover approximately 10 to 15% of the Main Plant area, while 35 to 40% of the Main Plant, generally referred to as the West Yard, was used for storage of general equipment, raw material, and finished product, as well as incidental waste disposal. The majority of the Flood Plain contains surface impoundments, while the remaining was virtually undisturbed, with only small areas of incidental contamination with no specific source.

American Cyanamid entered into Administrative Consent Orders (ACOs) related to investigation and remediation at the Site with the New Jersey Department of Environmental Protection (NJDEP) in 1982 and 1988; the 1988 ACO was amended in 1994. The ACO, as amended, also incorporated the requirements of the Discharge to Groundwater (DGW) and Hazardous and Solid Waste Amendments (HWSA) Permits for the Site and the Impound 8 facility. In 2009, EPA became the lead agency providing oversight for the Site investigation and cleanup work. By letter dated March 17, 2009, NJDEP informed Respondent that it would hold in abeyance the requirements of the ACOs, with limited possible exceptions, as long as Respondent implemented the Site investigation and cleanup under EPA oversight. The 1982 ACO required that impoundments at the Site be evaluated for potential to impact ground water and resulted in identification of sixteen impoundments for subsequent evaluation. The 1988 ACO required corrective action for these impoundments as well as investigation and remediation of impacted soils and groundwater. A Site-wide Feasibility Study was initiated for the facility resulting in a draft being submitted to the NJDEP and USEPA in May 2007. Comments provided by the agencies resulted in multiple revisions of the Report including the identification of additional objectives and remedial alternatives. The most recent version was submitted in December 2010 with comments currently under negotiation.

The objective of the Site-wide FS was to develop and evaluate remedial alternatives for the Site in as comprehensive a manner as possible, to satisfy the requirements of the 1988 ACO, as amended in 1994. To accomplish this, the areas of the Site not yet remediated were considered as a single operable unit (OU). During the development and evaluation of the remedial alternatives as part of the Site-wide FS, it became evident that handling of the Impoundments 1 and 2 material was unique and complex. The location within the Flood Plain, acidity, and the odiferous and tacky nature of the material posed significant difficulties in evaluating the technical feasibility, implementability and ability to meet regulatory requirements (*i.e.*, permitting) for any alternative that included removal of the material. After extensive review and interaction with Stakeholders (including USEPA and NJDEP), it was decided that additional data specific to the Impoundments 1 and 2 material were needed to complete the evaluations. Therefore, by mid-2009, Wyeth and the Stakeholders mutually agreed to move Impoundments 1 and 2 into a separate FFS, while moving forward with the Site-wide FS Report for the remainder of the Site. The Site-wide FS Report was submitted in December 2010 and USEPA (and other Stakeholder) comments pertaining to the Site-wide FS Report were received on May 12, 2011. The public comment period pertaining to the proposed Site-wide remedy is anticipated to begin later in 2011.

Previous remedial activities at Impoundments 1 and 2 include the removal of approximately 3 million gallons of light oily sludge (LOS) material from the top of each impoundment, leaving only the more viscous, tacky layers. Removal of the LOS layer from Impoundment 1 was completed in 1967; LOS removal at Impoundment 2 was completed in 1987.

This Work Plan presents the overall approach for the FFS for Impoundments 1 and 2, including proposed technology evaluations, interaction with ongoing Site programs, and interim reviews, approvals, and Stakeholder involvement.

1.2 OBJECTIVE AND APPROACH

The objective of the FFS is to develop remedial alternatives for the Impoundments 1 and 2 materials and present sufficient information for evaluation of alternatives and recommendation of a remedy.

The 1988 ACO, as amended, addresses remediation under RCRA, as well as CERCLA/SARA at the Site. Under RCRA, the alternative development and evaluation process is referred to as a CMS, while the CERCLA equivalent terminology is FS. Although this report uses the CERCLA terminology, both regulatory programs are accommodated, because the CERCLA FS evaluation criteria encompass each of the issues covered by the RCRA evaluation criteria. Additionally, as required by the 1988 ACO, as amended, this report was prepared consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP; 40 CFR Part 300) and USEPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (USEPA, 1988).

As of March 17, 2009 the USEPA is the lead CERCLA regulatory agency for this Site, with NJDEP providing support, as necessary. Remedial activities at the Site are governed by CERCLA, RCRA and the ACO, as amended, but also consider the intent of the New Jersey's *Technical Requirements for Site Remediation* (Tech Regs) pursuant to New Jersey Administrative Code Title 7, Chapter 26E (NJAC 7:26E).

The objective of this FFS Work Plan is to document the process to be followed during the FFS.

2 FOCUSED FEASIBILITY STUDY PROCESS OVERVIEW

The FFS process is generally conducted in four phases:

1. Establishment of Remedial Action Objectives (RAOs), General Response Actions (GRAs) and volumes of areas of media to which these RAOs and GRAs are applied,
2. Identification and screening of technologies,
3. Development and screening of alternatives, and
4. Detailed analysis of alternatives.

Alternatives for remediation are developed by assembling combinations of technologies and the media to which they would be applied, into alternatives that address contamination on a site-wide basis or for an identified OU. This process comprises eight separate steps, which will be presented within four individual documents: 1) *FFS Work Plan;* 2) *Technology Evaluation Work Plan;* 3) *Technology Evaluation Report*; and 4) *Assembly and Screening of Remedial Alternatives Technical Memorandum*. To facilitate comprehensive interaction with the identified stakeholders, it is proposed to divide these steps into distinct groups with interim submittals for review, modification, consensus, and finalization, prior to moving on to the next step. These steps are identified below in relation to the proposed submittals:

Included in this FFS Work Plan document:

1. **Development of RAOs and GRAs for each medium of interest.** GRAs define containment, treatment, removal or other actions that may be taken to satisfy the RAOs for the impoundments.

2. **Identification of volumes or areas of media** to which general response actions may be applied. This step takes into account the chemical and physical characterization of the impoundments.

To be included in the Technology Evaluation Work Plan/Technology Evaluation Report:

3. **Identification and screening of technologies** applicable to each GRA. This step is taken to eliminate those technologies that cannot be technically implemented for the impoundments. The general response actions are further defined to specify remedial technology types as part of this step.

To be included in the Technology Evaluation Report:

4. **Identification of chemical-, location- and action-specific Applicable, Relevant and Appropriate Requirements (ARARs).** CERCLA incorporates into law the CERCLA Compliance Policy, which specifies that remedial actions conducted under CERCLA meet federal standards, requirements, criteria or limitations that are determined to be legally applicable or relevant and appropriate requirements. Also included in the CERCLA Compliance Policy is the provision that state ARARs must be met if they are more stringent that federal ARARs. A number of federal statutes are specifically cited in CERCLA, including: the Solid Waste Disposal Act (SWDA), the Toxic Substances Control Act (TSCA), the Safe Drinking Water Act (SDWA), the Clean Air Act (CAA), the Clean Water Act (CWA), and the Marine Protection Research and Sanctuaries Act (MPRSA).

5. **Identification and evaluation of technology process options** with respect to effectiveness, implementability, and relative cost to select a representative process for each technology type to be retained for further consideration. These selected processes are intended to represent the broader range of process options within a general technology type through the evaluation, rather than define specific processes to be used for the impoundments. To the extent that different process options may have a significant bearing on remedy selection, a representative suite of process options will be used in the evaluation.

To be included in the Assembly and Screening of Remedial Alternatives Technical Memorandum:

6. **Assembly of the selected representative technologies into alternatives** that represent a range of treatment and containment combinations, as appropriate for the impoundments. To the extent practicable, alternatives will be developed that utilize permanent solutions, alternative treatment technologies, or resource recovery technologies. Every attempt will be made to satisfy the preference for treatment to reduce toxicity, mobility, or volume as a principle element, or a detailed explanation as to why treatment is not feasible will be provided.

7. **Performance of initial screening of alternatives** on the basis of effectiveness, implementability, and cost. The purpose of this step is to limit the number of alternatives to undergo detailed analysis to a manageable number.

To be included in the FFS Report:

8. **Performance of the detailed analysis of alternatives** and development of a recommended alternative, in which alternatives carried through the screening step are further refined, as appropriate, and analyzed in detail with respect to specific evaluation criteria. The detailed analysis will be conducted to result in providing Stakeholders with sufficient information to compare alternatives with respect to the evaluation criteria and, ultimately, to select an appropriate remedy for the impoundments.

To address CERCLA requirements and the additional technical and policy considerations for selecting remedial alternatives, the National Contingency Plan (NCP) specifies nine evaluation criteria. These criteria serve as the basis for conducting the detailed analysis and for subsequently selecting an appropriate remedial action. In accordance with the preamble to the NCP (*Federal Register*, March 8, 1990) the nine evaluation criteria are categorized into three groups: threshold criteria, primary balancing criteria and modifying criteria, as follows:

- Threshold Criteria
  - Overall protection of human health and the environment
  - Compliance with ARARs
- Primary Balancing Criteria
  - Long-term effectiveness and permanence
  - Reduction of toxicity, mobility or volume through treatment
  - Short-term effectiveness

  - Implementability
  - Cost
- Modifying Criteria
  - State acceptance
  - Community acceptance

The threshold criteria must be satisfied in order for an alternative to be eligible for selection. The primary balancing criteria are used to balance the trade-offs between alternatives, and the modifying criteria are only formally considered after public comment has been received on the FFS report and the proposed plan.

Each alternative is evaluated individually using the nine criteria. Subsequently, the alternatives are compared to each other, again using the nine criteria. Based on the detailed evaluations, an alternative is recommended for implementation.

3 INITIAL EVALUATION

3.1 REMEDIAL ACTION OBJECTIVES

RAOs are goals for protection of human health and the environment at a site, which are identified for specific environmental media or OUs. RAOs are developed based on contaminants of concern and associated exposure or migration pathways.

RAOs for impoundment material at the Site were previously presented as part of the Site-Wide FS; these RAOs apply to the Impoundments 1 and 2 material as well:

- Prevent and minimize human and ecological exposure to contaminants in impoundment materials and adjacent soils at levels above relevant risk-based remediation criteria, and
- Prevent and minimize sources of groundwater impacts (*i.e.* reduce chemical loadings to groundwater) resulting in long-term improvement of groundwater quality and eventual achievement of applicable regulatory criteria

3.2 GENERAL RESPONSE ACTIONS

The next step in the FS process is the identification of GRAs, which address the affected media and the RAOs. GRAs are categories of remedial actions and encompass various technologies. The following GRAs have been developed to address the RAOs for the Site in general, and apply to Impoundments 1 and 2:

- Institutional actions: These include engineering and institutional controls such as access restrictions, monitoring and deed restrictions, to limit access and exposure to contaminants.
- Containment actions: These are actions, such as capping or hydraulic control, that contain materials and prevent migration or exposure.
- Treatment actions: These actions can be *in-situ* or *ex-situ* and treat contaminants to reduce mobility, toxicity or volume.
- Excavation/disposal actions: These are actions that permanently dispose of the material, either on-site or off-site (applies only to soil/impoundment material and not ground water).
- No further action (required as part of the FS process).

3.3 VOLUMES AND AREAS OF MEDIA

3.3.1 Data Adequacy Assessment

Remedial investigation of the Site began in the early 1980s. Since that time, data has been collected for Impoundments 1 and 2 as part of multiple programs, the most extensive of which have been:

- Lagoons 1 and 2 Characterization (O'Brien & Gere, 1982)
- Impoundment Characterization Program (Blasland, Bouck, and Lee, 1990)
- Group III Impoundments CMS/FS (O'Brien & Gere, 1997)
- Impoundments 1 and 2 Characterization Program (O'Brien & Gere, November 2010)

The most recent program, conducted in 2010, was performed in anticipation of this FFS to develop a database of the chemical and physical properties of the impoundment material reflecting current analytical methods and detection limits. This program also provided data from multiple locations and depths throughout the impoundments to most accurately characterize the heterogeneity of the material. With this and other studies, data collected for the impoundment material to date is adequate for the completion of the FFS.

3.3.2 Impoundment 1

Impoundment 1 has a surface area of approximately 2.1 acres. It was constructed in 1956 and used until 1965 for the storage of sludge from a coal oil refining process. Between 1966 and 1967, the top layer of Impoundment 1, consisting of approximately 3 million gallons of LOS material, was removed, leaving only the more viscous, tacky layers.

The total volume of material in Impoundment 1 is approximately 24,200 yd^3. A layer of hard crumbly (HC) material (approximately 13,700 yd^3) is present at the bottom of the impoundment. The remaining impoundment material consists of viscous rubbery (VR) material (900 yd^3), sand/silt-like material (1,900 yd^3), clay-like material (2,700 yd^3), and coal aggregate material (5,000 yd^3). Impoundment 1 is covered with a synthetic liner for odor control; a water cap is present over the synthetic liner. Most of Impoundment 1 material has a pH between 0.5 and 2 S.U. The water cap is primarily rainwater, and has a pH near neutral (7 S.U.).

Primary chemical constituents of the material include volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals, as well as some alcohols, sulfur compounds, and aldehydes. Table 1 presents a statistical summary of Impoundment 1 material developed during the 2010 characterization program.

3.3.3 Impoundment 2

Impoundment 2 has a surface area of approximately 2.3 acres. It was constructed in 1947 and was used until 1956 for the storage of sludge from a coal oil refining process. Between 1986 and 1987, the top layer of Impoundment 2, consisting of approximately 3 million gallons LOS, was removed, leaving non-pumpable (i.e. viscous, tacky) sludge.

The total volume of material in Impoundment 2 is approximately 30,300 yd^3. The material in Impoundment 2 forms two distinct layers: an upper VR tar layer and a lower layer of HC tar. Impoundment 2 contains approximately 10,900 yd^3 of the VR layer at an estimated depth of 0 to 4 feet, and approximately 12,900 yd^3 of the HC layer at an estimated depth of 4 to 9 feet. The remaining 6,500 yd^3 consists of material that is a mixture of the VR and HC materials. A water cover of approximately 2 feet is maintained over Impoundment 2 for odor control. Impoundment 2 material has a pH between 0.3 and 2.3 S.U. The water cap is primarily rainwater, and has a pH near neutral (7 S.U.).

Similar to Impoundment 1, primary chemical constituents of the material include VOCs, SVOCs, and metals, as well as some alcohols, sulfur compounds, and aldehydes. Table 2 presents a statistical summary of Impoundment 2 material developed during the 2010 characterization program.

3.4 RISK ASSESSMENT

3.4.1 Potential Migration and Exposure Pathways

As presented in the Baseline Endangerment Assessment (BEA, Blasland, Bouck, and Lee, 1992), potential migration and exposure pathways from Impoundments 1 and 2 include impacts to groundwater in the Flood Plain south of the impoundments. Impact to the air through volatilization of VOCs from the impoundment material was also identified as a potential pathway; this pathway is currently mitigated through the use of caps (synthetic liner and/or water) on each impoundment.

3.4.2 Potential Receptor Populations

As described in the BEA, potential human receptors include on-site employees, on-site trespassers, residents of the immediate off-site area (within 1 mile of the site perimeter), employees of industrial or commercial facilities located adjacent to the Site, and individuals pursuing recreational activities on the Raritan River. Since this time, onsite manufacturing has ceased, fences and security cameras have been installed to deter trespassers. With respect to environmental receptors, limited habitat was identified in the Impoundment 1 and 2 area.

3.4.3 Baseline Endangerment Assessment Overview

Analyses performed during completion of the BEA provided an assessment of the potential human health and environmental risks posed by existing site conditions. A quantitative risk assessment was completed for affected media for which a complete human exposure pathway exists. A qualitative ecological assessment was also conducted to evaluate potential exposure pathways. Potential risks were evaluated based on an integrated analysis of three factors: contaminant concentration, toxicity, and exposure potential. In order for an exposure event to occur, a complete exposure pathway would be required. A complete exposure pathway would consist of a contaminant source and a release mechanism, a retention or transport medium, a point of potential receptor contact with the contaminated medium, and an exposure route at the contact point.

As detailed in the BEA, Impoundments 1 and 2 were identified as having complete exposure pathways through which potential receptor contact could result in unacceptable risks resulting from the emissions of VOCs from impoundment material. Based on the calculations presented, the potential cancer risk associated with emissions from these impoundments was calculated to be 2.4×10^{-6}, slightly above the USEPA's 1×10^{-6} acceptable risk guideline. Although additional characterization data has been obtained since the completion and approval of the BEA, this characterization data is relatively consistent with the data on which the BEA is based, and it is not anticipated that the general conclusions of the BEA (i.e., risks are above acceptable guidelines) would change.

4. FOCUSED FEASIBILITY STUDY PROCESS OVERVIEW

This FFS process will consist of the following primary elements:

- Development of *FFS Work Plan* and Stakeholder acceptance/approval
- Technology Evaluation, including:
  - » Development of *Technology Evaluation Work Plan* and Stakeholder acceptance/approval
  - » Performance of Field/Laboratory Testing
  - » Identification and Screening of Remedial Technologies and Process Options
  - » Development of *Technology Evaluation Report* and Stakeholder acceptance/approval
- Development of *Assembly and Screening of Remedial Alternatives Technical Memorandum* and Stakeholder acceptance/approval
- Development of the *FFS Report* and Stakeholder acceptance/approval

Additional information about each of these steps is presented below.

4.1 TECHNOLOGY EVALUATION

4.1.1 Overview of Proposed Evaluation

In order to identify the appropriate remedial alternative for Impoundments 1 and 2, three main parts of the remediation process must be evaluated:

- Excavation/Material Removal (*ex situ* remedial alternatives only)
- Material Handling
- Material Transportation, Treatment, and Final Disposition

In addition to evaluation of the remediation process itself, secondary aspects of the remedial alternatives will be assessed relative to the effectiveness, implementability, and cost of each alternative. These additional evaluations include:

- Air Emissions Capture and Control
- Air Emissions Treatment
- In Place Containment Technologies (*in situ* remedial alternatives only)
- Material Compatibility/Materials of Construction

Table 3 presents an overview of potential process evaluations to be performed as part of the FFS. As indicated on the table, for most processes, a desktop engineering evaluation will initially be performed. However, the desktop evaluation may not be required for processes that have been successfully employed during the remediation of other site impoundments. Following the engineering evaluations, field and laboratory studies will be designed. These studies will focus on full-scale implementability of each process, and will be optimized to maximize data gathering while minimizing field and laboratory testing efforts (*e.g.* quantification of air emissions and testing of control technologies during testing of excavation, material handling, and material treatment processes).

4.1.2 Interaction with Industry Experts

Due to the unique nature of the impoundment material and the challenges experienced during previous field programs, a team of industry experts (O'Brien & Gere, Focus Environmental, and ARCADIS) familiar with the remediation of similar materials has been assembled to identify and evaluate the potential processes. This team will bring a practical understanding of the benefits and limitations of each process and streamline the evaluation through understanding of successful and unsuccessful remediation programs addressing comparable materials at this and other sites.

4.1.3 Work Plan Development and Approval

A *Technology Evaluation Work Plan* will be developed for the testing program for approval and acceptance by Stakeholders prior to implementation. Technologies will be identified for further laboratory/bench and field studies based on the following criteria:

- Outcome of the desktop engineering evaluations of potential remedial processes. These desktop engineering evaluations will be performed during work plan development and presented in the work plan.
- Input of industry experts regarding the potential success or limitation of each process.
- Identified data gaps with respect to the evaluation of each potential technology relative to the nine criteria (discussed in detail below).

This Work Plan will identify the methods of testing each potential process, the data and samples to be collected as part of the testing, and the proposed analytical methodologies.

4.1.4 Testing (Laboratory and Field)

Following the approval and acceptance of the Work Plan by Stakeholders, the evaluation and testing program will be implemented.

4.1.5 Reporting and Approval

Following the completion of laboratory and field testing, a *Technology Evaluation Report* will be prepared presenting the results of the testing. This report will also present the initial screening of the technologies tested relative to overall implementation of the various *in situ* and *ex situ* remedies prior to the assembly of potential remedial alternatives. This *Technology Evaluation Report* will be submitted for acceptance and approval by Stakeholders prior to the completion of subsequent steps.

4.2 TECHNICAL MEMORANDUM – ASSEMBLY AND SCREENING OF REMEDIAL ALTERNATIVES

Remedial alternatives will be developed based on the outcome of the technology evaluation. A technical memorandum will be developed presenting the feasible remedial alternatives and screening of these alternatives in accordance with CERCLA guidance (USEPA, 1988). Prior to completion of the FFS report, this memorandum will be submitted to Stakeholders for acceptance and approval.

4.3 FOCUSED FEASIBILITY STUDY REPORT

In the FFS Report, a detailed analysis will be documented for each remedial alternative in comparison to CERCLA's nine threshold, balancing, and modifying evaluation criteria.

In addition to the nine CERCLA criteria, potential remedial alternatives will also be evaluated with respect to green remediation strategies as presented in the USEPA's Superfund Green Remediation Strategy guidance document (September 2010) and the USEPA Region 2 Green Site Assessment and Remediation Checklist (September 2010). Guidelines presented in these documents consider the environmental "footprint" of remediation activities as they relate to five core elements:

- Energy,
- Air and atmosphere,
- Water,
- Land and ecosystems, and
- Materials and waste.

Green remediation strategies will be taken into consideration with the goal of implementing the selected remedy while taking into account the use of natural resources and energy efficiency, reduction of negative impacts on the environment, minimization or elimination of pollution at its source, and reduction of waste to the greatest extent possible. When evaluating the environmental footprint of the remedy, care will be taken not to simply transfer the impact by moving it from one environmental media to another, or by moving waste from an on-site location to an off-site location.

Once each alternative has been evaluated independently, the alternatives will be compared to each other with respect to each of the nine CERCLA criteria and the Green Remediation Strategies to assist in the identification of a preferred alternative.

The cover letter of the FFS Report will include rational and a recommendation of the preferred remedial alternative. The report will be submitted to Stakeholders for approval and acceptance prior to the final selection, establishment of the ROD, and implementation of the preferred remedial alternative.

4.4 INTERACTION WITH ON-GOING PROGRAMS

Although Impoundments 1 and 2 were removed from the Site-wide FS, potential remedies for these two impoundments will be evaluated in the context of the selected Site-wide remedy, specifically with respect to groundwater in the Flood Plain south of Impoundments 1 and 2.

4.4.1 Site-wide Groundwater Remedy

A groundwater pump-and-treat system currently operates at the Site. The system draws bedrock groundwater from two extraction wells in the northern portion of the Main Plant area. Overburden groundwater is also drawn into the bedrock aquifer and partially controlled by this system.

As addressed in the Site-wide FFS, the overall remedial goal of the preferred groundwater remedy is to provide hydraulic capture within the overburden and bedrock aquifers. Consequently hydraulic capture is an integral component of each remedial alternative in the Site-wide FSR (except the no further action alternatives). Details of the remedial design for hydraulic capture of groundwater, including groundwater from the flood plain south of Impoundments 1 and 2, will be developed following the collection of data during the proposed Preliminary Design Investigation (PDI).

4.4.2 Groundwater Discharge IRM

In conjunction with the groundwater remedy identified in the Site-wide FS, an interim fast-track remedial measure (IRM) has been initiated in cooperation with USEPA for the groundwater in the Flood Plain south of Impoundments 1 and 2. Overburden groundwater in this area has been observed to be migrating to the Raritan River through the riverbank. The IRM includes the following:

- Installation of sand bags containing granulated activated carbon (GAC) along the portions of the river bank where migration of groundwater has been observed. This Phase was completed in March 2011 and is effectively abating the discharge of groundwater contaminants to the Raritan River.

- Installation of an overburden groundwater collection system between Impoundments 1 and 2 and the portion of the river bank where groundwater migration and subsequent surface water interaction has been observed. This collection and pretreatment system is anticipated to be completed and operational on or before Q1 2012.

Groundwater from the collection system will be captured for treatment either on-site or through permitted discharge to Somerset Raritan Valley Sewerage Authority (SRVSA).

4.5 STAKEHOLDER INVOLVEMENT

USEPA is the regulatory lead for the Site, and will provide review, comment, and ultimate approval of each submission prior to completion of the subsequent steps of the FFS process. Other Stakeholders will also be provided FFS documents for review and comment; these comments will be provided to USEPA for inclusion in formal comments to be addressed by Pfizer.

Stakeholders to be included in the FFS process include:

Regulatory Lead:	USEPA Region 2
Regulatory Support:	New Jersey Department of Environmental Protection
Community Involvement:	Concerned Residents Involved with Stopping Incinerators (CRISIS)
Community Relations:	Bridgewater Township

5 SCHEDULE

The following is the anticipated schedule for the completion of the Impoundments 1 and 2 FFS; a more detailed schedule is presented as Appendix A. Please note that this schedule includes review by USEPA and other Stakeholders, and may be revised to allow for longer review times for these Stakeholders as needed.

FFS Work Plan:	
Initial Submission/Comment	June 2011
Finalization/Approval	Within 4 weeks of receipt of agency comments
Technology Evaluation:	
Initial Work Plan Submission/Comment	Within 8 weeks of receipt of FFS Work Plan agency comments
Work Plan Finalization/Approval	Within 4 weeks of receipt of agency comments
Technology Evaluation	16 weeks, beginning 2 weeks following the finalization of the Work Plan
Initial Report Submission/Comment	Within 14 weeks of completion of the Technology Evaluation
Finalization/Approval	Within 4 weeks of receipt of agency comments
Assembly and Screening of Remedial Alternatives:	
Technical Memorandum Initial Submission/Comment	Within 6 weeks of receipt of Technology Evaluation Report comments
Finalization/Approval	Within 4 weeks of receipt of agency comments
FFS Report:	
Initial Submission/Comment	Within 10 weeks of finalization of Technical Memorandum
Finalization/Approval	Within 4 weeks of receipt of agency comments

Tables

Wyeth Holdings Corporation
Former American Cyanamid Site
Impoundments 1 and 2 FFS
Table 1
Impoundment 1 Statistical Summary

Parameter	CAS #	Number of Valid Samples	Number of Unique Samples[a]	Detects[a]	Minimum Detected[b]	Maximum Detected[b]	Mean[b]	Standard Deviation[b]	Mean + 1 Std. Dev.[b]	Coefficient of Variation[b]	Skewness[b]	95% UCL[b]	Method[b]
Volatile Organic Compounds (VOCs) - ug/kg													
1,2-Dichlorobenzene	95-50-1	25	24	25	3,390	2,550,000	761,381	687,954	1,449,335	0.904	1.081	2,130,392	Use 99% Chebyshev (Mean, Sd) UCL
1,3,5-Trimethylbenzene	108-67-8	25	24	24	2,300	1,110,000	347,202	320,227	667,429	0.922	0.948	984,445	Use 99% Chebyshev (Mean, Sd) UCL
1,3-Dichlorobenzene	541-73-1	25	5	5	153	1,200,000	292,545	332,982	625,527	1.138	1.251	567,505	Use 95% Adjusted Gamma UCL
1,4-Dichlorobenzene	106-46-7	25	18	18	197	850,000	195,197	283,453	478,650	1.452	1.548	377,114	Use 95% Adjusted Gamma UCL
Acetone	67-64-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	71-43-2	25	24	25	78,500	207,000,000	47,762,304	58,054,409	105,816,713	1.215	1.567	88,212,763	Use 95% Adjusted Gamma UCL
Carbon Disulfide	75-15-0	25	14	14	100	1,200,000	195,466	262,019	457,485	1.34	2.506	364,565	Use 95% Adjusted Gamma UCL
Chlorobenzene	108-90-7	25	16	17	233	2,400,000	499,194	640,422	1,139,616	1.283	1.671	996,494	Use 95% Adjusted Gamma UCL
Chloromethane	74-87-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexane	1735-17-7	25	2	2	1,000	1,200,000	301,640	328,184	629,824	1.088	1.243	521,507	Use 95% Approximate Gamma UCL
Ethanol	64-17-5	25	1	1	1,000	135,000	76,532	41,833	118,365	0.547	-0.731	159,779	Use 99% Chebyshev (Mean, Sd) UCL
Ethylbenzene	100-41-4	25	25	25	1,480	529,000	168,443	155,607	324,050	0.924	0.718	275,372	Use 95% Approximate Gamma UCL
Isopropylbenzene	98-82-8	25	25	25	6,580	1,710,000	531,564	531,072	1,062,636	0.999	0.972	859,925	Use 95% Approximate Gamma UCL
m,p-Xylene	XYLMP	25	25	25	439	5,610,000	1,923,598	1,728,049	3,651,647	0.898	0.605	3,261,955	Use 95% Approximate Gamma UCL
Methanol	67-56-1	25	2	2	2,000	275,000	154,504	83,508	238,012	0.54	-0.698	320,683	Use 99% Chebyshev (Mean, Sd) UCL
Methyl Acetate	79-20-9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MethylCyclohexane	108-87-2	25	6	6	2,400	1,200,000	303,129	326,802	629,931	1.078	1.257	496,447	Use 95% Approximate Gamma UCL
o-Xylene	95-47-6	25	24	25	4,060	1,340,000	477,514	419,095	896,609	0.878	0.604	771,219	Use 95% Approximate Gamma UCL
Toluene	108-88-3	25	25	25	1,440	40,700,000	11,425,122	12,264,223	23,689,345	1.073	1.114	21,206,257	Use 95% Adjusted Gamma UCL
Xylene (Total)	1330-20-7	25	25	25	4,500	6,910,000	2,400,192	2,142,678	4,542,870	0.893	0.595	3,979,395	Use 95% Approximate Gamma UCL
Semivolatiles Organic Compounds (SVOCs) - ug/kg													
1,1'-Biphenyl	92-52-4	25	24	24	147	135,000	30,107	32,436	62,543	1.077	1.778	46,886	Use 95% Approximate Gamma UCL
1,2-Dichlorobenzene	95-50-1	25	24	25	3,390	2,550,000	761,381	687,954	1,449,335	0.904	1.081	2,130,392	Use 99% Chebyshev (Mean, Sd) UCL
1,2-Diphenylhydrazine	122-66-7	25	1	1	28.5	11,800	1,951	3,306	5,257	1.695	2.12	4,833	Use 95% Chebyshev (Mean, Sd) UCL
1,4-Dichlorobenzene	106-46-7	25	18	18	197	850,000	195,197	283,453	478,650	1.452	1.548	377,114	Use 95% Adjusted Gamma UCL
2,4-Dimethylphenol	105-67-9	25	21	21	70	87,800	19,521	25,164	44,685	1.289	1.775	32,799	Use 95% Approximate Gamma UCL
2-Chloronaphthalene	91-58-7	25	23	23	81.1	101,000	20,674	26,060	46,734	1.261	1.848	34,286	Use 95% Approximate Gamma UCL
2-Methylnaphthalene	91-57-6	25	25	25	506	678,000	174,110	171,242	345,352	0.984	1.311	275,975	Use 95% Approximate Gamma UCL
2-Methylphenol	95-48-7	25	13	13	28.5	43,400	8,015	10,833	18,848	1.352	1.756	15,189	Use 95% Adjusted Gamma UCL
3 & 4-Methylphenol	34METHYL	25	20	20	28.5	236,000	46,845	63,725	110,570	1.36	1.622	92,847	Use 95% Adjusted Gamma UCL
Acenaphthene	83-32-9	25	11	11	14	25,600	6,449	7,660	14,109	1.188	1.062	11,950	Use 95% Adjusted Gamma UCL
Acenaphthylene	208-96-8	25	4	4	14	40,600	2,945	8,117	11,062	2.756	4.509	10,021	Use 95% Chebyshev (Mean, Sd) UCL
Acetophenone	98-86-2	25	25	25	94.3	1,190,000	275,708	341,652	617,360	1.239	1.556	519,995	Use 95% Adjusted Gamma UCL
Aniline	62-53-3	25	25	25	189	6,030,000	672,158	1,237,244	1,909,402	1.841	3.645	1,365,401	Use 95% Adjusted Gamma UCL
Anthracene	120-12-7	25	5	5	14	103,000	6,502	20,735	27,237	3.189	4.563	32,400	Use 97.5% Chebyshev (Mean, Sd) UCL
Benzidine	92-87-5	25	1	1	285	95,000	15,607	25,872	41,479	1.658	2.427	38,162	Use 95% Chebyshev (Mean, Sd) UCL
Benzo(a)Anthracene	56-55-3	25	13	13	89.1	87,300	7,522	17,662	25,184	2.348	4.175	14,472	Use 95% Adjusted Gamma UCL
Benzo(a)Pyrene	50-32-8	25	9	9	47.6	77,900	5,731	15,743	21,474	2.747	4.373	19,456	Use 95% Chebyshev (Mean, Sd) UCL
Benzo(b)Fluoranthene.	205-99-2	25	9	9	14	74,700	7,314	15,367	22,681	2.101	3.809	14,541	Use 95% Adjusted Gamma UCL
Benzo(g,h,i)Perylene	191-24-2	25	9	9	14	39,300	3,885	7,992	11,877	2.057	3.94	7,221	Use 95% Adjusted Gamma UCL
Benzo(k)Fluoranthene	207-08-9	25	9	9	14	49,400	5,156	10,268	15,424	1.991	3.649	9,793	Use 95% Adjusted Gamma UCL
Benzoic acid	65-85-0	25	18	18	285	1,410,000	298,767	410,639	709,406	1.374	1.608	602,062	Use 95% Adjusted Gamma UCL
bis(2-Ethylhexyl)adipate	103-23-1	25	8	8	28.5	157,000	11,786	31,426	43,212	2.666	4.457	24,703	Use 95% Adjusted Gamma UCL
bis(2-Ethylhexyl)Phthalate	117-81-7	25	1	1	28.5	9,500	1,550	2,592	4,142	1.672	2.424	4,364	Use 95% H-UCL
Carbazole	86-74-8	25	4	4	28.5	46,500	3,880	9,319	13,199	2.402	4.314	12,004	Use 95% Chebyshev (Mean, Sd) UCL
Chrysene	218-01-9	25	13	13	78.9	86,600	7,392	17,389	24,781	2.353	4.27	14,081	Use 95% Adjusted Gamma UCL
Dibenzo(a,h)Anthracene	53-70-3	25	4	4	14	18,200	1,864	3,774	5,638	2.025	3.693	5,155	Use 95% Chebyshev (Mean, Sd) UCL
Dibenzofuran	132-64-9	25	25	25	184	94,100	29,591	25,651	55,242	0.867	0.964	44,214	Use 95% Approximate Gamma UCL
Dimethyl Phthalate	131-11-3	25	6	6	28.5	86,700	11,171	22,542	33,713	2.018	2.344	39,326	Use 97.5% Chebyshev (Mean, Sd) UCL
Fluoranthene	206-44-0	25	22	22	315	262,000	22,127	52,732	74,859	2.383	4.285	54,056	Use 95% H-UCL
Fluorene	86-73-7	25	3	3	14	101,000	6,221	20,951	27,172	3.368	4.294	32,389	Use 97.5% Chebyshev (Mean, Sd) UCL
Indeno(1,2,3-Cd)Pyrene	193-39-5	25	9	9	14	40,200	3,942	8,187	12,129	2.077	3.937	7,348	Use 95% Adjusted Gamma UCL
Methylcyclohexane	108-87-2	25	6	6	2,400	1,200,000	303,129	326,802	629,931	1.078	1.257	496,447	Use 95% Approximate Gamma UCL
Naphthalene	91-20-3	25	25	25	5,010	12,600,000	3,111,321	3,172,052	6,283,373	1.02	1.437	5,081,172	Use 95% Approximate Gamma UCL
Nitrobenzene	98-95-3	25	23	23	28.5	6,600,000	1,169,016	1,599,540	2,768,556	1.368	2.036	2,505,377	Use 95% Adjusted Gamma UCL
n-Nitrosodiphenylamine	86-30-6	25	2	2	70	31,100	6,042	9,456	15,498	1.565	1.734	14,286	Use 95% Chebyshev (Mean, Sd) UCL
Phenanthrene	85-01-8	25	14	14	14	396,000	37,286	81,613	118,899	2.189	3.832	199,694	Use 99% Chebyshev (Mean, Sd) UCL
Phenol	108-95-2	25	11	11	90	79,700	12,894	22,018	34,912	1.708	2.227	24,685	Use 95% Adjusted Gamma UCL
Pyrene	129-00-0	25	20	20	125	188,000	16,600	38,095	54,695	2.295	4.144	31,330	Use 95% Adjusted Gamma UCL

Wyeth Holdings Corporation
Former American Cyanamid Site
Impoundments 1 and 2 FFS
Table 1
Impoundment 1 Statistical Summary

Parameter	CAS #	Number of Valid Samples	Number of Unique Samples[a]	Detects[a]	Minimum Detected[b]	Maximum Detected[b]	Mean[b]	Standard Deviation[b]	Mean + 1 Std. Dev.[b]	Coefficient of Variation[b]	Skewness[b]	95% UCL[b]	Method[b]
Metals - mg/kg													
Aluminum	7429-90-5	25	25	25	185	8,030	1,058	1,588	2,646	1.5	3.927	1,426	Use 95% H-UCL
Antimony	7440-36-0	25	1	1	1	22.3	2.562	4.141	6.703	1.616	4.887	6.172	Use 95% Chebyshev (Mean, Sd) UCL
Arsenic	7440-38-2	25	17	19	1.05	15.8	6.5	4.215	10.715	0.648	0.763	8.286	Use 95% Approximate Gamma UCL
Barium	7440-39-3	25	6	6	10.5	81.5	27.82	18.17	45.99	0.653	1.711	34.5	Use 95% H-UCL
Beryllium	7440-41-7	25	5	7	0.105	0.94	0.317	0.237	0.554	0.748	1.558	0.524	Use 95% Chebyshev (Mean, Sd) UCL
Calcium	7440-70-2	25	13	13	260	183,000	14,449	38,657	53,106	2.675	3.884	91,376	Use 99% Chebyshev (Mean, Sd) UCL
Chromium	7440-47-3	25	22	25	2.4	56.2	11.89	14.64	26.53	1.231	2.226	24.65	Use 95% Chebyshev (Mean, Sd) UCL
Cobalt	7440-48-4	25	2	2	2.6	8.3	4.844	1.455	6.299	0.3	0.471	5.342	Use 95% Student's-t UCL
Copper	7440-50-8	25	25	25	12.1	148	52.7	33.27	85.97	0.631	0.909	67.04	Use 95% Approximate Gamma UCL
Cyanide	57-12-5	25	2	2	0.2	10.6	2.432	2.22	4.652	0.913	2.726	3.594	Use 95% H-UCL
Iron	7439-89-6	25	25	25	291	40,900	5,684	9,952	15,636	1.751	2.951	10,227	Use 95% H-UCL
Lead	7439-92-1	25	25	25	7.8	168	64.61	45.06	109.67	0.697	0.767	84.26	Use 95% Approximate Gamma UCL
Magnesium	7439-95-4	25	9	9	260	117,000	7,162	23,333	30,495	3.258	4.709	53,593	Use 99% Chebyshev (Mean, Sd) UCL
Manganese	7439-96-5	25	25	25	3.5	174	37.13	48.47	85.6	1.305	2.159	54.78	Use 95% Approximate Gamma UCL
Mercury	7439-97-6	25	20	24	0.0155	2.6	0.957	0.741	1.698	0.774	0.543	1.362	Use 95% Approximate Gamma UCL
Nickel	7440-02-0	25	8	9	2.05	70.3	11.46	17.11	28.57	1.494	2.608	26.37	Use 95% Chebyshev (Mean, Sd) UCL
Potassium	7440-09-7	25	1	1	500	1,350	914.8	257.1	1,172	0.281	0.011	1,003	Use 95% Student's-t UCL
Selenium	7782-49-2	25	18	21	1	13	7.032	4.059	11.091	0.577	0.117	8.421	Use 95% Student's-t UCL
Sodium	7440-23-5	25	10	10	500	4,500	1,658	1,170	2,828	0.705	1.088	2,116	Use 95% Approximate Gamma UCL
Vanadium	7440-62-2	25	5	6	2.6	43.3	8.2	8.482	16.682	1.034	3.374	15.59	Use 95% Chebyshev (Mean, Sd) UCL
Zinc	7440-66-6	25	20	21	1.55	44.8	10.14	9.651	19.791	0.952	2.194	13.77	Use 95% Approximate Gamma UCL
Miscellaneous													
Chloride (mg/kg)	16887-00-6	25	19	19	10	2,270	757.9	700.9	1,459	0.925	0.745	1,233	Use 95% Approximate Gamma UCL
Nitrogen, Ammonia (mg/kg)		25	14	14	4.3	207	44.08	57.14	101.22	1.296	1.882	66.34	Use 95% Approximate Gamma UCL
pH (s.u.)		25	24	NA	0.56	12.36	NA	3.096	NA	0.9	1.328	4.5	95% Student's-t UCL[c]
Sulfite (mg/kg)	14265-45-3	25	12	12	15	990	137	245.3	382.3	1.791	2.683	625.1	Use 99% Chebyshev (Mean, Sd) UCL
Total Phenolics (mg/kg)		25	19	20	8.6	766	157	173.3	330.3	1.104	2.076	233.6	Use 95% Approximate Gamma UCL
Sulfide (mg/kg)	18496-25-8	18	18	18	21.5	106	52.01	23.75	75.76	0.457	0.892	61.74	Use 95% Student's-t UCL
Isopropyl Alcohol	67-63-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Formaldehyde	50-00-0	5	3	3	561	26,500	5,863	11,537	17,400	1.968	2.236	57,199	Use 99% Chebyshev (Mean, Sd) UCL
PCBs													
Total Di PCBs		2	1	1	1,920	8,100	5,010	4,370	9,380	0.872	NA	NA	Too Few Observations To Calculate UCLs
Total Hexa PCBs		2	2	2	2,550	32,100	17,325	20,895	38,220	1.206	NA	NA	Too Few Observations To Calculate UCLs
Total Mono PCBs		2	1	1	630	20,200	10,415	13,838	24,253	1.329	NA	NA	Too Few Observations To Calculate UCLs
Total Penta PCBs		2	2	2	3,230	45,300	24,265	29,748	54,013	1.226	NA	NA	Too Few Observations To Calculate UCLs
Total Tetra PCBs		2	2	2	1,330	32,400	16,865	21,970	38,835	1.303	NA	NA	Too Few Observations To Calculate UCLs

Footnotes:
a: Statistical summary included both detect and non-detect data.
b: Statistical summary included only detected data. Non-detect data concentrations were divided in half and analyzed as detected data.
c: Assuming a normal sample distribution the 95% Students-t UCL value is utilized regardless of the suggested ProUCL value.

Wyeth Holdings Corporation
Former American Cyanamid Site
Impoundments 1 and 2 FFS
Table 2
Impoundment 2 Statistical Summary

Parameter	CAS #	Number of Valid Samples	Number of Unique Samples[a]	Detects[a]	Minimum Detected[b]	Maximum Detected[b]	Mean[b]	Standard Deviation[b]	Mean + 1 Std. Dev.[b]	Coefficient of Variation[b]	Skewness[b]	95% UCL[b]	Method[b]
Volatile Organic Compounds (VOCs) - ug/kg													
1,2-Dichlorobenzene	95-50-1	28	24	27	500,000	6,500,000	1,863,429	1,169,362	3,032,791	0.628	2.598	2,233,721	Use 95% H-UCL
1,3,5-Trimethylbenzene	108-67-8	28	24	27	102,000	6,500,000	487,071	1,188,025	1,675,096	2.439	5.159	1,465,712	Use 95% Chebyshev (Mean, Sd) UCL
1,3-Dichlorobenzene	541-73-1	28	19	19	15,300	6,500,000	359,782	1,216,478	1,576,260	3.381	5.115	2,647,186	Use 99% Chebyshev (Mean, Sd) UCL
1,4-Dichlorobenzene	106-46-7	28	23	27	50,800	6,500,000	376,336	1,202,024	1,578,360	3.194	5.265	1,366,508	Use 95% Chebyshev (Mean, Sd) UCL
Acetone	67-64-1	28	1	1	110,000	12,500,000	842,536	2,302,436	3,144,972	2.733	5.164	2,739,178	Use 95% Chebyshev (Mean, Sd) UCL
Benzene	71-43-2	28	28	28	16,700,000	183,000,000	52,246,429	39,882,369	92,128,798	0.763	1.838	65,288,332	Use 95% Approximate Gamma UCL
Carbon Disulfide	75-15-0	28	27	27	37,100	6,500,000	330,771	1,211,285	1,542,056	3.662	5.26	2,608,410	Use 99% Chebyshev (Mean, Sd) UCL
Chlorobenzene	108-90-7	28	13	28	18,200	13,000,000	823,157	2,407,139	3,230,296	2.924	5.149	5,349,419	Use 99% Chebyshev (Mean, Sd) UCL
Chloromethane	74-87-3	28	11	11	24,600	6,500,000	384,021	1,206,098	1,590,119	3.141	5.19	2,651,908	Use 99% Chebyshev (Mean, Sd) UCL
Cyclohexane	1735-17-7	28	4	4	23,000	6,500,000	413,786	1,202,826	1,616,612	2.907	5.154	2,675,520	Use 99% Chebyshev (Mean, Sd) UCL
Ethanol	64-17-5	28	7	7	1,050	50,000	23,784	22,450	46,234	0.944	0.244	65,997	Use 99% Chebyshev (Mean, Sd) UCL
Ethylbenzene	100-41-4	28	25	27	74,600	1,250,000	225,339	237,350	462,689	1.053	3.324	420,857	Use 95% Chebyshev (Mean, Sd) UCL
Isopropylbenzene	98-82-8	28	26	27	163,000	6,500,000	634,107	1,191,127	1,825,234	1.878	4.748	1,615,303	Use 95% Chebyshev (Mean, Sd) UCL
m,p-Xylene	XYLMP	28	27	27	758,000	5,660,000	1,904,179	1,175,589	3,079,768	0.617	1.684	2,299,661	Use 95% H-UCL
Methanol	67-56-1	28	15	15	2,100	344,000	92,650	93,380	186,030	1.008	1.436	135,683	Use 95% Approximate Gamma UCL
Methyl Acetate	79-20-9	28	4	4	55,000	6,500,000	597,929	1,254,329	1,852,258	2.098	4.212	2,956,505	Use 99% Chebyshev (Mean, Sd) UCL
MethylCyclohexane	108-87-2	28	6	6	65,000	6,500,000	485,429	1,207,970	1,693,399	2.488	4.915	1,480,499	Use 95% Chebyshev (Mean, Sd) UCL
o-Xylene	95-47-6	28	27	27	209,000	1,290,000	484,393	313,051	797,444	0.646	1.517	742,270	Use 95% Chebyshev (Mean, Sd) UCL
Toluene	108-88-3	28	28	28	3,930,000	40,200,000	11,867,857	8,700,937	20,568,794	0.733	1.797	14,886,869	Use 95% H-UCL
Xylene (Total)	1330-20-7	28	25	27	970,000	6,950,000	2,344,286	1,442,152	3,786,438	0.615	1.737	2,815,812	Use 95% H-UCL
Semivolatiles Organic Compounds (SVOCs) - ug/kg													
1,1'-Biphenyl	92-52-4	28	26	26	4,800	80,200	38,297	23,214	61,511	0.606	0.298	45,769	Use 95% Student's-t UCL
1,2-Dichlorobenzene	95-50-1	28	24	27	500,000	6,500,000	1,863,429	1,169,362	3,032,791	0.628	2.598	2,233,721	Use 95% H-UCL
1,2-Diphenylhydrazine	122-66-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	28	23	27	50,800	6,500,000	376,336	1,202,024	1,578,360	3.194	5.265	1,366,508	Use 95% Chebyshev (Mean, Sd) UCL
2,4-Dimethylphenol	105-67-9	28	11	11	1,000	14,400	9,071	4,585	13,656	0.505	-0.805	12,848	Use 95% Chebyshev (Mean, Sd) UCL
2-Chloronaphthalene	91-58-7	28	6	6	400	34,800	6,708	8,613	15,321	1.284	2.137	14,351	Use 95% H-UCL
2-Methylnaphthalene	91-57-6	28	27	28	65,600	656,000	246,050	155,315	401,365	0.631	1.104	302,078	Use 95% Approximate Gamma UCL
2-Methylphenol	95-48-7	28	4	4	600	5,580	3,370	1,622	4,992	0.481	-0.217	4,705	Use 95% Chebyshev (Mean, Sd) UCL
3 & 4-Methylphenol	34METHYL	28	16	17	4,700	26,900	9,621	6,572	16,193	0.683	1.317	15,035	Use 95% Chebyshev (Mean, Sd) UCL
Acenaphthene	83-32-9	28	4	4	200	180,000	16,567	43,928	60,495	2.652	3.146	99,167	Use 99% Chebyshev (Mean, Sd) UCL
Acenaphthylene	208-96-8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	98-86-2	28	28	28	34,600	652,000	241,450	129,977	371,427	0.538	1.246	289,287	Use 95% Approximate Gamma UCL
Aniline	62-53-3	28	21	21	410	173,000	49,621	44,970	94,591	0.906	0.836	134,180	Use 99% Chebyshev (Mean, Sd) UCL
Anthracene	120-12-7	28	12	12	200	23,700	5,329	5,490	10,819	1.03	1.668	7,724	Use 95% Approximate Gamma UCL
Benzidine	92-87-5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)Anthracene	56-55-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)Pyrene	50-32-8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)Fluoranthene	205-99-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)Perylene	191-24-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)Fluoranthene	207-08-9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzoic acid	65-85-0	28	18	19	9,500	950,000	123,839	171,820	295,659	1.387	4.381	170,317	Use 95% Approximate Gamma UCL
bis(2-Ethylhexyl)adipate	103-23-1	28	11	11	440	158,000	21,574	35,179	56,753	1.631	2.696	50,553	Use 95% Chebyshev (Mean, Sd) UCL
bis(2-Ethylhexyl)Phthalate	117-81-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	86-74-8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	218-01-9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)Anthracene	53-70-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	132-64-9	28	28	28	7,070	47,300	23,654	11,996	35,650	0.507	0.553	27,516	Use 95% Student's-t UCL
Dimethyl Phthalate	131-11-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	206-44-0	28	26	26	2,400	37,200	12,290	10,051	22,341	0.818	1.119	16,113	Use 95% Approximate Gamma UCL
Fluorene	86-73-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-Cd)Pyrene	193-39-5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	108-87-2	28	6	6	65,000	6,500,000	485,429	1,207,970	1,693,399	2.488	4.915	1,480,499	Use 95% Chebyshev (Mean, Sd) UCL
Naphthalene	91-20-3	28	28	28	1,040,000	13,700,000	4,879,643	3,408,717	8,288,360	0.699	1.118	6,136,041	Use 95% Approximate Gamma UCL
Nitrobenzene	98-95-3	28	8	8	400	110,000	21,421	32,518	53,939	1.518	1.538	82,566	Use 99% Chebyshev (Mean, Sd) UCL
n-Nitrosodiphenylamine	86-30-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	85-01-8	28	24	25	1,000	239,000	66,556	67,639	134,195	1.016	1.199	98,078	Use 95% Approximate Gamma UCL
Phenol	108-95-2	28	3	3	400	13,700	3,846	2,822	6,668	0.734	1.687	6,171	Use 95% Chebyshev (Mean, Sd) UCL
Pyrene	129-00-0	28	13	13	200	14,600	2,583	2,657	5,240	1.029	3.575	7,578	Use 99% Chebyshev (Mean, Sd) UCL

Wyeth Holdings Corporation
Former American Cyanamid Site
Impoundments 1 and 2 FFS
Table 2
Impoundment 2 Statistical Summary

Parameter	CAS #	Number of Valid Samples	Number of Unique Samples[a]	Detects[a]	Minimum Detected[b]	Maximum Detected[b]	Mean[b]	Standard Deviation[b]	Mean + 1 Std. Dev.[b]	Coefficient of Variation[b]	Skewness[b]	95% UCL[b]	Method[b]
Metals - mg/kg													
Aluminum	7429-90-5	28	28	28	51.6	870	183.4	152.6	336	0.832	3.557	227.1	Use 95% Approximate Gamma UCL
Antimony	7440-36-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	7440-38-2	28	18	26	1	7.1	3.321	1.466	4.787	0.441	1.08	3.793	Use 95% Student's-t UCL
Barium	7440-39-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	7440-41-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	7440-70-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	7440-47-3	28	24	28	1	16.1	4.511	3.76	8.271	0.834	1.495	5.878	Use 95% Approximate Gamma UCL
Cobalt	7440-48-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	7440-50-8	28	28	28	4.9	27.8	13.91	5.736	19.646	0.412	0.838	15.76	Use 95% Student's-t UCL
Cyanide	57-12-5	28	3	3	0.165	1.3	0.603	0.434	1.037	0.72	0.392	0.96	Use 95% Chebyshev (Mean, Sd) UCL
Iron	7439-89-6	28	28	28	226	4,170	927.1	811.1	1,738	0.875	2.746	1,175	Use 95% Approximate Gamma UCL
Lead	7439-92-1	28	28	28	9	235	55.13	42.45	97.58	0.77	2.956	68.28	Use 95% Approximate Gamma UCL
Magnesium	7439-95-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	7439-96-5	28	26	28	2.4	19.3	6.982	4.071	11.053	0.583	1.552	8.361	Use 95% Approximate Gamma UCL
Mercury	7439-97-6	28	24	27	0.015	20.9	1.006	3.906	4.912	3.881	5.26	8.351	Use 99% Chebyshev (Mean, Sd) UCL
Nickel	7440-02-0	28	8	8	1.9	14.2	3.305	2.81	6.115	0.85	2.827	5.62	Use 95% Chebyshev (Mean, Sd) UCL
Potassium	7440-09-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	7782-49-2	28	23	28	2.1	13.3	6.45	2.434	8.884	0.377	1.018	7.292	Use 95% Approximate Gamma UCL
Sodium	7440-23-5	28	27	28	1,020	11,400	3,071	2,026	5,097	0.66	2.811	3,677	Use 95% Approximate Gamma UCL
Vanadium	7440-62-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	7440-66-6	28	12	14	0.95	13.3	2.834	3.218	6.052	1.135	2.392	5.485	Use 95% Chebyshev (Mean, Sd) UCL
Miscellaneous													
Chloride (mg/kg)	16887-00-6	28	27	28	40.9	7,010	872.6	1,692	2,565	1.939	2.796	1,866	Use 95% H-UCL
Nitrogen, Ammonia (mg/kg)		28	8	8	1.7	75	24.87	19.25	44.12	0.774	1.28	40.76	Use 95% H-UCL
pH (s.u.)		28	26	NA	0.3	2.33	NA	0.537	NA	0.374	-0.195	1.609	95% Student's-t UCL[c]
Sulfite (mg/kg)	14265-45-3	28	23	23	15	1,230	322	341.4	663.4	1.06	1.334	482.3	Use 95% Approximate Gamma UCL
Total Phenolics (mg/kg)		28	28	28	14.8	279	99.06	74.09	173.15	0.748	1.124	127.6	Use 95% Approximate Gamma UCL
Sulfide (mg/kg)	18496-25-8	13	13	13	11	799	165	236.9	401.9	1.436	2.065	329.6	Use 95% Approximate Gamma UCL
Isopropyl Alcohol	67-63-0	28	2	2	1,000	50,000	21,245	23,435	44,680	1.103	0.457	65,311	Use 99% Chebyshev (Mean, Sd) UCL
Formaldehyde	50-00-0	5	4	4	362	1,660	846.4	546.6	1,393	0.646	0.9	1,368	Use 95% Student's-t UCL
PCBs													
Total Di PCBs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Hexa PCBs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Mono PCBs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Penta PCBs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Tetra PCBs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Footnotes:
a: Statistical summary included both detect and non-detect data.
b: Statistical summary included only detected data. Non-detect data concentrations were divided in half and analyzed as detected data.
c: Assuming a normal sample distribution the 95% Students-t UCL value is utilized regardless of the suggested ProUCL value.

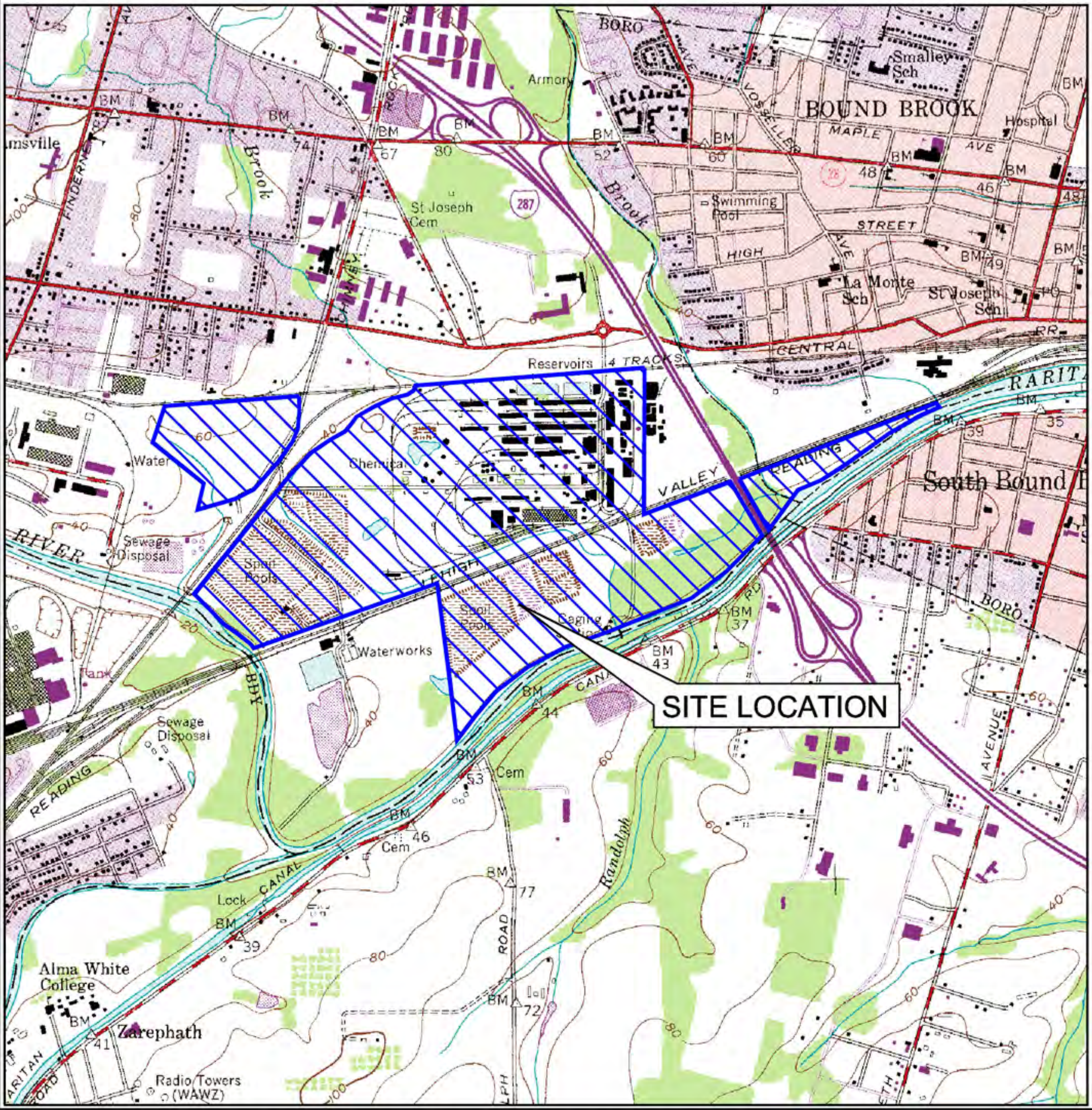
Wyeth Holdings Corporation
Former American Cyanamid Site
Impoundments 1 and 2 FFS
Table 3
Potential Processes Requiring Evaluation

Process	Evaluations		
	Engineering Evaluation	**Laboratory/Bench Studies**	**Field Studies**
Excavation/Material Removal			
Excavation via clam shell (through liquid cap)	X		(1)
Excavation via excavator (through liquid cap)	X		(1)
Excavation via drag line (through liquid cap)	X		(1)
Freezing material for removal by cutting	X	(1)	
Enclosed screw augering	X		(1)
In-situ heating/material pumping	X	(1)	(2)
Water jetting/slurry pumping (and associated dewatering)	X	(1)	(2)
Solvent or oil addition/slurry pumping	X	(1)	(2)
Hydraulic extrusion	X	(1)	(2)
Segmented excavation (sheeting/inflatable barriers/dikes)	X		(1)
Material Handling			
In-situ aggregate or reagent addition	X		(1)
In-situ neutralization	X		(1)
In-situ solidifcation	X		(1)
Ex-situ aggregate or reagent addition		X	(1)
Conveyor tests	X	(1)	(2)
Screw auger testing	X	(1)	(2)
Heated vessels (tanks and pipes) and pumping	X	(1)	(2)
Material dewatering (i.e. gravity drainage, extrusion)	X		(1)
Water extraction of acid	X	(1)	(2)
Material Treatment			
Ex situ			
Thermal treatment/fuel reuse (on-site and off-site)	X	(1)	
Solidification/stablization		X	
Heated vacuum extraction (TEVET or comparable)	X	(1)	
Solvent washing/distillation	X	(1)	
In situ			
Stabilization	X		(1)
Thermal treatment/stablization	X	(1)	(2)
Vitrification	X	(1)	
Emissions Control			
Large enclosure for excavation	X		
Small enclosure for excavation	X		
Excavation through oil , etc. (as odor control)	X		(1)
Emission control for support operations (storage, transportation)	X	(1)	(2)
Local ventilation	X		(1)
Barriers (foams/mulches)		(1)	(2)
Masking sprays		X	(1)
Treating sprays (i.e. air-atomized enzyme or chemical treatment)	X	(1)	(2)
Emissions Treatment			
Thermal oxidation/acid scrubbing (thermal treatments only)	X		(1)
Activated carbon (with particulate filtration)	X		(1)
Condensation/solvent recovery	X		(1)
Acid gas scrubbing	X		(1)
In Place Containment			
Diversionary structures	X		
Sealing of berms/encapsulation	X	(1)	
Review/site visits of successful flood plain landfill containment	X		
Protective measure trials		X	(1)
Capping/containment	X	(1)	
Material Compatibility/Materials of Construction (2)	X	(1)	(2)

(1) Performance of evaluation dependent on the result of preceeding engineering evaluation or laboratory/bench study
(2) Performance of evaluation dependent on the result of preceeding engineering evaluation and laboratory/bench study

Figures

FIGURE 1

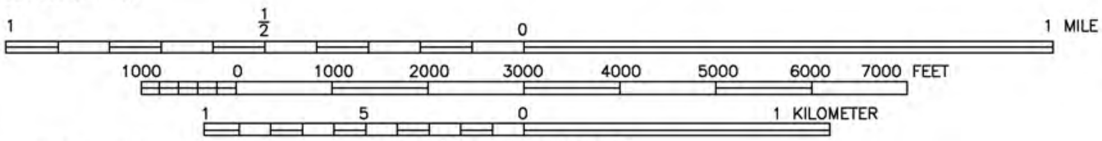


ADAPTED FROM: BOUND BROOK, NJ U.S.G.S. 7.5 MIN. QUAD

QUADRANGLE LOCATION

WYETH HOLDINGS CORPORATION
FORMER AMERICAN CYANAMID SITE
BRIDGEWATER, NEW JERSEY

SITE LOCATION MAP



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FILE NO. 5772.47194
JUNE 2011

O'BRIEN & GERE

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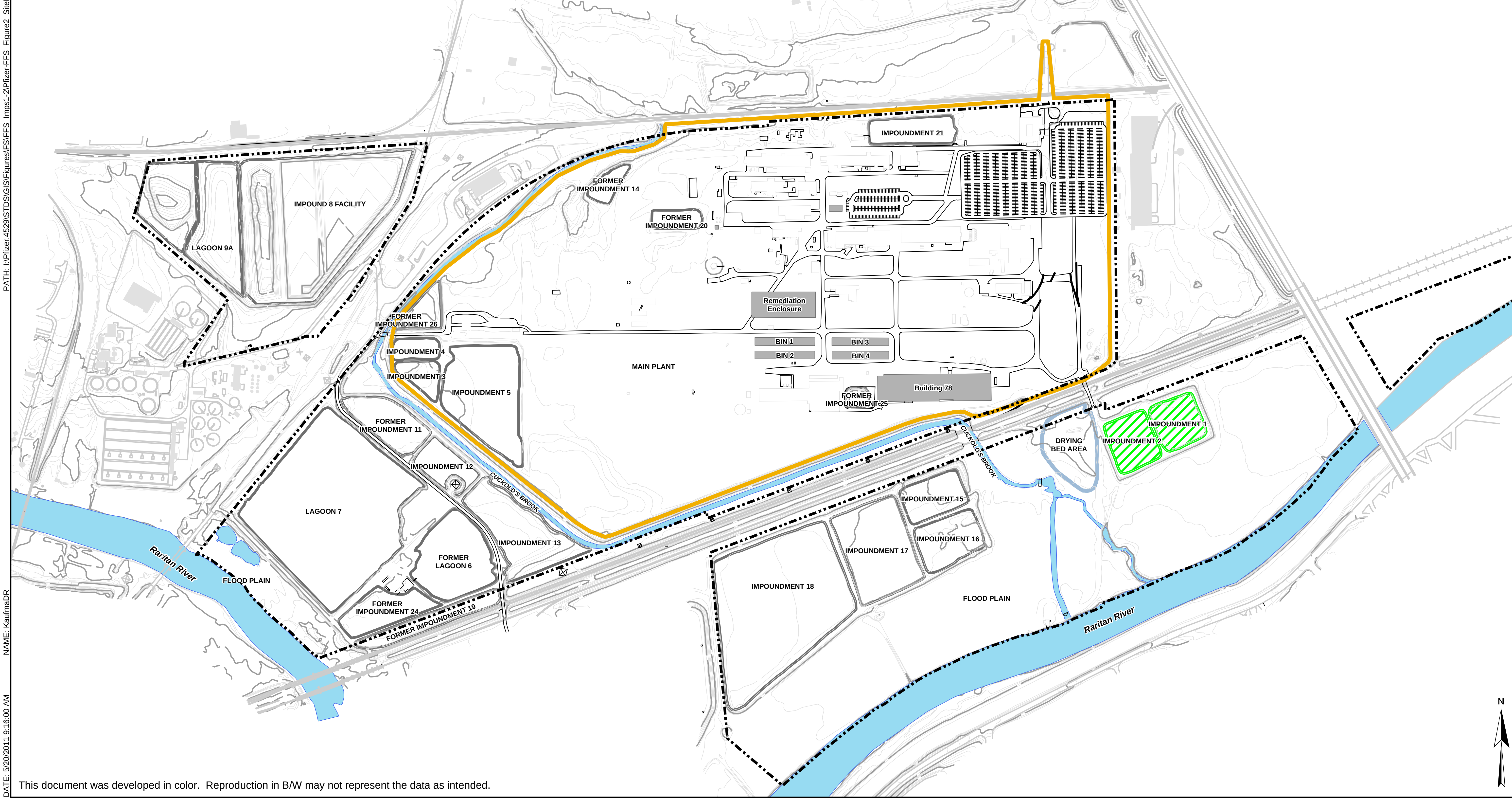
NAME: KaufmaDR

DATE: 5/20/2011 9:16:00 AM

FIGURE 2



LEGEND

- Approximate Property Boundary
- Flood Control Dike
- Drying Bed Area
- Impoundments Included in this Focused Feasibility Study

WYETH HOLDINGS CORPORATION
FORMER AMERICAN CYANAMID SITE
FOCUSED FEASIBILITY STUDY:
IMPOUNDMENTS 1 AND 2

0 300 600 1,200 Feet

SITE MAP

FILE NO.
4529/45863

DATE
JUNE 2011

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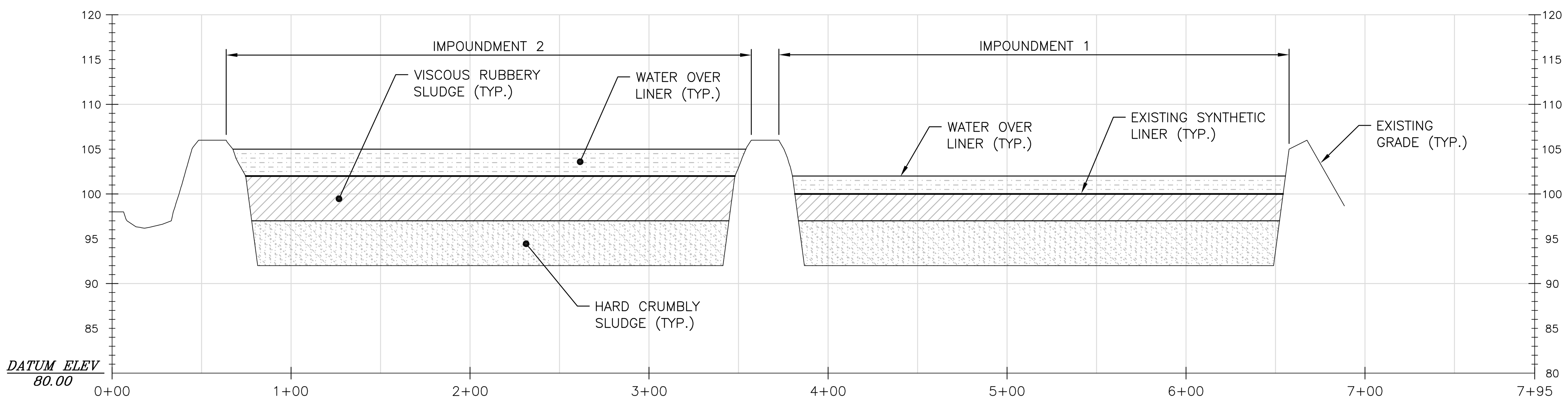
SITE PLAN

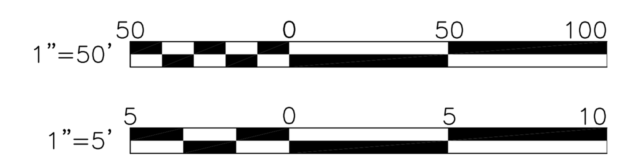
SCALE: 1"=50'

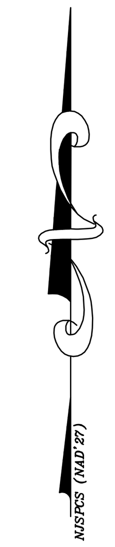


SECTION

SCALE: 1"=50' (HORIZONTAL)
1"=10' (VERTICAL)

NOTE:
1. WHERE AVAILABLE, HISTORICAL SAMPLE LOCATIONS ARE PRESENTED. HOWEVER, MOST HISTORICAL SAMPLES WERE COLLECTED FROM EXCAVATED MATERIAL AND SPECIFIC LOCATION INFORMATION IS NOT AVAILABLE. APPROXIMATE LOCATION INFORMATION IS PRESENTED.





LEGEND

- PROPERTY LINE
- ELEVATION CONTOURS (5' INTERVALS)
- ELEVATION CONTOURS (1' INTERVALS)
- GROUND SURFACE ELEVATION
- EDGE OF WATER
- FENCE
- RAILROAD TRACKS

WYETH HOLDINGS CORPORATION

BOUND BROOK IMPOUNDMENTS 1 & 2 FOCUSED FEASIBILTY STUDY

IMPOUNDMENT PLAN

FIGURE 3

FILE NO. 5772.47194
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Appendices

Former American Cyanamid Site
Bridgewater, New Jersey
Impoundments 1 and 2 Focused Feasibility Study

ID	Task Name	Duration
1	**Work Plan**	**101 days**
2	Agency Approval of Approach	1 day
3	Work Plan Development	4 wks
4	Agency Review	6 wks
5	Work Plan Finalization	4 wks
6	Agency Review	6 wks
7	**Technology Evaluations (includes Field and Lab Studies)**	**320 days**
8	Testing Plan Development	8 wks
9	Agency Review	6 wks
10	Testing Plan Finalization	4 wks
11	Agency Review	2 wks
12	Technology Evaluations	4 mons
13	Analytical	2 mons
14	Technology Evaluation Report Development	8 wks
15	Agency Review	6 wks
16	Technology Evaluation Report Finalization	4 wks
17	Agency Review	6 wks
18	**Technical Memorandum**	**110 days**
19	Technical Memorandum Devleopment	6 wks
20	Agency Review	6 wks
21	Technical Memorandum Finalization	4 wks
22	Agency Review	6 wks
23	**FFS Report**	**50 days**
24	FFS Report Development	10 wks